Remarks

The Office Action mailed April 2, 2007 has been carefully reviewed and the foregoing amendment and following remarks have been made in consequence thereof.

Claims 1-32 are now pending in this application. Claims 1-3, 6-9, 13-15, 17-20, 24-26, and 28-30 stand rejected. Claims 4, 5, 10-12, 16, 21-23, 27, 31, and 32 stand objected to.

The rejection of Claim 1 under 35 U.S.C. § 102(b) as being anticipated by Harvey (U.S. Pat. No. 6,275,038) ("Harvey") is respectfully traversed.

Harvey describes a method for evaluating inhomogeneity in a magnetic polarizing field. The method includes acquiring data using a first k-space scan ($S1(k_x,k_y)$) and a second k-space scan ($S2(k_x,k_y)$) during a single application of a magnetic resonance imaging (MRI) pulse sequence (70). The second k-space scan ($S2(k_x,k_y)$) is time delayed from the first k-space scan ($S1(k_x,k_y)$). A first spatial image ($IM1(x,y)$) and a second spatial image ($IM2(x,y)$) are generated from the first k-space scan ($S1(k_x,k_y)$) and the second k-space scan ($S2(k_x,k_y)$), respectively. A first measurement of inhomogeneity is generated from the first spatial image ($IM1(x,y)$), and a second measurement of inhomogeneity is generated from the second spatial image ($IM2(x,y)$). A measurement of the change is determined by the difference between the first and second measurements of inhomogeneity with respect to phase difference and the time delay. The measurement of the change is used to correct for instrumental error phase accumulation.

Claim 1 recites a method for generating an estimate of inhomogeneity comprising "acquiring an image; generating a threshold value using the acquired image; generating a first estimate of inhomogeneity using the acquired image; generating a second estimate of inhomogeneity using the acquired image; and generating a final estimate of inhomogeneity using at least the first and second estimates and the threshold value."

Harvey does not describe or suggest a method for generating an estimate of inhomogeneity as recited in Claim 1. More specifically, Harvey does not describe or suggest a method that includes generating a threshold value using an acquired image. Further, Harvey does not describe or suggest a method that includes generating a first and a second estimate of inhomogeneity using the acquired image. Moreover, Harvey does not describe or

suggest a method that includes generating a final estimate of inhomogeneity using at least the first and second estimates of inhomogeneity and the threshold value. Rather, Harvey describes generating a first measurement of inhomogeneity from a first spatial image and generating a second measurement of inhomogeneity from a second spatial image, which is time-delayed from the first spatial image. Harvey further describes that a measurement of the change of inhomogeneity is determined using the two spatial images and the time-delay between images.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Harvey.

For at least the reasons set forth above, Applicant respectfully requests that the Section 102 rejection of Claim 1 be withdrawn.

The rejection of Claims 2, 3, 6-9, 15, 25, 26, and 28-30 under 35 U.S.C. § 103(a) as being unpatentable over Harvey in view of Gur et al. (U.S. Pat. No. 5,627,907) ("Gur") is respectfully traversed.

Harvey is described above. Gur describes a method for detecting abnormal regions in living tissue depicted in a radiograph. A pair of digital mammograms are obtained (S1) by a device (1) and/or a digitizer (9). Each image of the pair is segmented or normalized (S2). After each image is boundary enhanced (S3), the images are aligned and subtracted (S4). Non-linear thresholding is performed (S5) on the subtracted images, based on digital values in the pair of original images. The pair of thresholded images is used to label and size blobs (S6) to identify suspected abnormal regions. Gur further describes that the enhanced images may be subtracted then thresholded to generate a binary image showing blobs.

Claims 2, 3, and 6-9 depend, directly or indirectly, from Claim 1, which recites a method for generating an estimate of inhomogeneity comprising "acquiring an image; generating a threshold value using the acquired image; generating a first estimate of inhomogeneity using the acquired image; generating a second estimate of inhomogeneity using the acquired image; and generating a final estimate of inhomogeneity using at least the first and second estimates and the threshold value."

Neither Harvey nor Gur, considered alone or in combination, describes or suggests a method for generating an estimate of inhomogeneity as recited in Claim 1. More specifically,

neither Harvey nor Gur, considered alone or in combination, describes or suggests a method that includes generating a first and a second estimate of inhomogeneity using an acquired image. Further, neither Harvey nor Gur, considered alone or in combination, describes or suggests a method that includes generating a final estimate of inhomogeneity using at least the first and second estimates of inhomogeneity and the threshold value. Rather, Harvey describes generating a first measurement of inhomogeneity from a first spatial image and generating a second measurement of inhomogeneity from a second spatial image, which is time-delayed from the first spatial image. Harvey further describes that a measurement of the change of inhomogeneity is determined using the two spatial images and the time-delay between images. Gur describes obtaining a pair of images, subtracting the images, and then thresholding the subtracted image to identify blobs.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted as patentable over Harvey in view of Gur.

When the recitations of Claims 2, 3, and 6-9 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2, 3, and 6-9 likewise are patentable over Harvey in view of Gur.

Claim 15 depends from independent Claim 13, which recites a magnetic resonance imaging (MRI) system comprising "a main magnet configured to generate a substantially uniform magnetic field; a radio frequency pulse generator configured to excite the magnetic field; a gradient field generator configured to generate gradients extending in different directions in the magnetic field; a receiver configured to receive magnetic field magnetic resonance (MR) signals representative of an object; and a computer operationally coupled to said receiver, said computer configured to: acquire an image; generate a threshold value using the acquired image; generate a first estimate of inhomogeneity using the acquired image; generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates and the threshold value."

Neither Harvey nor Gur, considered alone or in combination, describes or suggests a magnetic resonance imaging (MRI) system as recited in Claim 13. More specifically, neither Harvey nor Gur, considered alone or in combination, describes or suggests a magnetic resonance imaging system that includes a computer configured to generate a first and second

estimate of inhomogeneity using an acquired image. Further, neither Harvey nor Gur, considered alone or in combination, describes or suggests a magnetic resonance imaging system that includes a computer configured to generate a final estimate of inhomogeneity using at least the first and second estimates of inhomogeneity and the threshold value. Rather, Harvey describes generating a first measurement of inhomogeneity from a first spatial image and generating a second measurement of inhomogeneity from a second spatial image, which is time-delayed from the first spatial image. Harvey further describes that a measurement of the change of inhomogeneity is determined using the two spatial images and the time-delay between images. Gur describes obtaining a pair of images, subtracting the images, and then thresholding the subtracted image to identify blobs.

Accordingly, for at least the reasons set forth above, Claim 13 is submitted as patentable over Harvey in view of Gur.

When the recitations of Claim 15 are considered in combination with the recitations of Claim 13, Applicant submits that dependent Claim 15 likewise is patentable over Harvey in view of Gur.

Claim 25 recites a computer readable medium encoded with a program configured to instruct a computer to "acquire an image; generate a threshold value using the acquired image; generate a first estimate of inhomogeneity using the acquired image; generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates and the threshold value."

Neither Harvey nor Gur, considered alone or in combination, describes or suggests a computer readable medium encoded with a program configured to instruct a computer as recited in Claim 25. Specifically, neither Harvey nor Gur, considered alone or in combination, describes or suggests a computer readable medium encoded with a program configured to instruct a computer to generate a first and a second estimate of inhomogeneity using an acquired image. Further, neither Harvey nor Gur, considered alone or in combination, describes or suggests a computer readable medium encoded with a program configured to instruct a computer to generate a final estimate of inhomogeneity using at least the first and second estimates of inhomogeneity and the threshold value. Rather, Harvey describes generating a first measurement of inhomogeneity from a first spatial image and generating a second measurement of inhomogeneity from a second spatial image, which is

time-delayed from the first spatial image. Harvey further describes that a measurement of the change of inhomogeneity is determined using the two spatial images and the time-delay between images. Gur describes obtaining a pair of images, subtracting the images, and then thresholding the subtracted image to identify blobs.

Accordingly, for at least the reasons set forth above, Claim 25 is submitted as patentable over Harvey in view of Gur.

Claims 26 and 28-30 depend, directly or indirectly, from independent Claim 25. When the recitations of Claims 26 and 28-30 are considered in combination with the recitations of Claim 25, Applicant submits that dependent Claims 26 and 28-30 likewise are patentable over Harvey in view of Gur.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 2, 3, 6-9, 15, 25, 26, and 28-30 be withdrawn.

The rejection of Claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Harvey in view of Dean et al. (U.S. Pat. No. 6,445,182) ("Dean") is respectfully traversed.

Harvey is described above. Dean describes a three-dimensional (3D) magnetic resonance imaging (MRI) system (100) that performs object-induced geometric distortion correction. The MRI system (110) includes a static magnet (132) for producing a substantially uniform magnetic field, a pulse program generator (142) for controlling a set of gradient amplifiers and coils (134), and a radio frequency transmitter (152) for causing magnetic resonance in the aligned dipoles of a subject (102). A MRI pulse sequence is performed to acquire (202) a first 3D magnetic resonance (MR) image. The MRI pulse sequence is repeated to acquire (202) a second 3D MR image. A computer system (110) computes (210) a voxel error map based on a phase difference (204) between the first and the second 3D MR images. The computer system (110) then corrects (212) voxel positions in one of the 3D MR images in accordance with the voxel error map.

Claim 13 recites a magnetic resonance imaging (MRI) system comprising "a main magnet configured to generate a substantially uniform magnetic field; a radio frequency pulse generator configured to excite the magnetic field; a gradient field generator configured to generate gradients extending in different directions in the magnetic field; a receiver configured to receive magnetic field magnetic resonance (MR) signals representative of an

object; and a computer operationally coupled to said receiver, said computer configured to: acquire an image; generate a threshold value using the acquired image; generate a first estimate of inhomogeneity using the acquired image; generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates and the threshold value."

Neither Harvey nor Dean, considered alone or in combination, describes or suggests a magnetic resonance imaging system as recited in Claim 13. More specifically, neither Harvey nor Dean, considered alone or in combination, describes or suggests a magnetic resonance imaging system that includes a computer configured to generate a first and a second estimate of inhomogeneity using an acquired image. Further, neither Harvey nor Dean, considered alone or in combination, describes or suggests a magnetic resonance imaging system that includes a computer configured to generate a threshold value using the acquired image. Moreover, neither Harvey nor Dean, considered alone or in combination, describes or suggests a magnetic resonance imaging system that includes a computer configured to generate a final estimate of inhomogeneity using at least the first and second estimates of inhomogeneity and the threshold value. Rather, Harvey describes generating a first measurement of inhomogeneity from a first spatial image and generating a second measurement of inhomogeneity from a second spatial image, which is time-delayed from the first spatial image. Harvey further describes that a measurement of the change of inhomogeneity is determined using the two spatial images and the time-delay between images. Dean merely describes a three-dimensional magnetic resonance imaging system that includes a static magnet for producing a substantially uniform magnetic field, a pulse program generator for controlling a set of gradient amplifiers and coils, and a radio frequency transmitter for causing magnetic resonance in the aligned dipoles of a subject.

Accordingly, for at least the reasons set forth above, Claim 13 is submitted as patentable over Harvey in view of Dean.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claim 13 be withdrawn.

The rejection of Claims 14, 15, 17-20, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Harvey and Dean, and further in view of Gur is respectfully traversed.

Harvey, Dean, and Gur are described above.

Claims 14, 15, 17-20, and 24 depend, directly or indirectly, from Claim 13, which recites a magnetic resonance imaging (MRI) system comprising "a main magnet configured to generate a substantially uniform magnetic field; a radio frequency pulse generator configured to excite the magnetic field; a gradient field generator configured to generate gradients extending in different directions in the magnetic field; a receiver configured to receive magnetic field magnetic resonance (MR) signals representative of an object; and a computer operationally coupled to said receiver, said computer configured to: acquire an image; generate a threshold value using the acquired image; generate a first estimate of inhomogeneity using the acquired image; generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates and the threshold value."

None of Harvey, Dean, and Gur, considered alone or in combination, describe or suggest a magnetic resonance imaging system as recited in Claim 13. More specifically, none of Harvey, Dean, and Gur, considered alone or in combination, describe or suggest a magnetic resonance imaging system that includes a computer configured to generate a first and a second estimate of inhomogeneity using an acquired image. Further, none of Harvey, Dean, and Gur, considered alone or in combination, describe or suggest a magnetic resonance imaging system that includes a computer configured to generate a final estimate of inhomogeneity using at least the first and second estimates of inhomogeneity and the threshold value. Rather, Harvey describes generating a first measurement of inhomogeneity from a first spatial image and generating a second measurement of inhomogeneity from a second spatial image, which is time-delayed from the first spatial image. Harvey further describes that a measurement of the change of inhomogeneity is determined using the two spatial images and the time-delay between images. Dean merely describes a three-dimensional magnetic resonance imaging system that includes a static magnet for producing a substantially uniform magnetic field, a pulse program generator for controlling a set of gradient amplifiers and coils, and a radio frequency transmitter for causing magnetic resonance in the aligned dipoles of a subject, and Gur describes obtaining a pair of images, subtracting the images, and then thresholding the subtracted image to identify blobs.

Accordingly, for at least the reasons set forth above, Claim 13 is submitted as patentable over Harvey and Dean in view of Gur.

When the recitations of Claims 14, 15, 17-20, and 24 are considered in combination with the recitations of Claim 13, Applicant submits that dependent Claims 14, 15, 17-20, and 24 likewise are patentable over Harvey and Dean in view of Gur.

Moreover, Applicant respectfully submits that Section 103 rejections of Claims 2, 3, 6-9, 13-15, 17-20, 24, 26, and 28-30 are not proper rejections. Obviousness cannot be established by merely suggesting that it would have been obvious to one of ordinary skill in the art to modify Harvey with Dean and/or Gur. As explained by the Federal Circuit, "to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the Applicant." In re Kotzab, 54 USPQ2d 1308, 1316 (Fed. Cir. 2000); MPEP 2143.01.

Furthermore, as is well established, the mere fact that the prior art structure could be modified does not make such a modification obvious unless the prior art suggests the desirability of doing so. See In re Gordon, 221 USPQ2d 1125 (Fed. Cir. 1984). The Federal Circuit has determined that:

> [I]t is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fritch, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). Further, under Section 103, "it is impermissible . . . to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 USPQ 391, 393 (CCPA 1965). Rather, some suggestion to combine such references and a reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 USPQ2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the cited art, or any reasonable expectation of success has been shown.

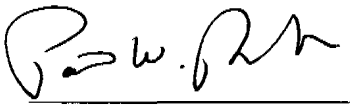
Specifically, there is no suggestion or motivation within Harvey, Dean, and/or Gur to combine Harvey with Dean and/or Gur to produce the claimed invention. Accordingly, since there is neither teaching nor suggestion in the cited art for the claimed combination, the

Section 103 rejections appear to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicant respectfully requests that the Section 103 rejections of Claims 2, 3, 6-9, 13-15, 17-20, 24, 26, and 28-30 be withdrawn.

For at least the reasons set forth above, Applicant respectfully requests the Section 103 rejection of Claims 2, 3, 6-9, 13-15, 17-20, 24, 26, and 28-30 be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully submitted,



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